

## CLAIMS

I claim:

- [c1]           1.       An image sensor comprising:  
  
                a plurality of pixels formed in a semiconductor substrate, each pixel including a light  
  
                                sensitive element;  
  
                a micro-lens over each of said light sensitive elements; and  
  
                a trench structure surrounding each of said micro-lenses.
- [c2]           2.       The image sensor of Claim 1 wherein said trench structure is circular.
- [c3]           3.       The image sensor of Claim 1 wherein said trench structure has a rectangular  
  
cross-section.
- [c4]           4.       The image sensor of Claim 1 wherein the micro-lenses are formed from  
  
polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).
- [c5]           5.       The image sensor of Claim 1 wherein said trench structure has a depth on  
  
the order of 0.2 microns.
- [c6]           6.       The image sensor of Claim 1 wherein said trench structure is formed in a  
  
layer that underlies said micro-lenses.

[c7]            7.        The image sensor of Claim 1 further including a color filter layer between  
said micro-lenses and said light sensitive elements.

[c8]            8.        A pixel of an image sensor comprising:  
a light sensitive element formed in a semiconductor substrate;  
a micro-lens over said light sensitive element; and  
a trench structure surrounding said micro-lens.

[c9]            9.        The pixel of Claim 8 wherein said trench structure is circular.

[c10]           10.       The pixel of Claim 8 wherein said trench structure has a rectangular cross-  
section.

[c11]           11.       The pixel of Claim 8 wherein the micro-lens is formed from  
polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).

[c12]           12.       The pixel of Claim 8 wherein said trench structure has a depth on the order  
of 0.2 microns.

[c13]           13.       The pixel of Claim 8 wherein said trench structure is formed in the material  
that underlies said micro-lenses.

[c14]           14.       The pixel of Claim 8 further including a color filter layer between said micro-  
lenses and said light sensitive elements.

- [c15]            15.     A method of forming a pixel of an image sensor comprising:  
  
                 forming a light sensitive element in a semiconductor substrate;  
  
                 forming a top planarizing layer over said light sensitive element;  
  
                 forming a trench structure in said top planarizing layer, said trench structure  
                                 encompassing said light sensitive element; and  
  
                 forming a microlens within the interior of said trench structure and over said light  
                                 sensitive element.
- [c16]            16.     The method of Claim 15 wherein said trench structure is formed in said top  
planarizing layer.
- [c17]            17.     The method of Claim 15 wherein said trench structure has a rectangular  
cross section.
- [c18]            18.     The method of Claim 15 wherein said trench structure is a closed shape.
- [c19]            19.     The method of Claim 15 further including forming a color filter layer  
between said microlens and said light sensitive element.